

## WHAT IS CLAIMED IS:

1           1. A method of making smokers' products of the  
2    type wherein a rod-shaped component is surrounded by  
3    a tubular wrapper which, in turn, is surrounded by a  
4    deformable strip, comprising the steps of:

5           contacting a portion of the tubular wrapper with  
6    a portion of the strip;

7           imparting to the wrapper a multiple-interval roll-  
8    ing movement to thus convolute the strip around the  
9    wrapper at least during a first interval of the rolling  
10   movement; and

11          changing the permeability of at least one of the  
12   tubular wrapper and the strip, at least during a second  
13   interval following said first interval of rolling move-  
14   ment.

1           2. The method of claim 1, wherein the smokers'  
2 products are filter cigarettes of n times unit length,  
3 n being a natural number including one.

1           3. The method of claim 1, wherein said first in-  
2 terval of rolling movement immediately precedes said  
3 second interval.

1           4. The method of claim 1, wherein said rolling  
2 movement includes a first-speed movement during said  
3 first interval and a second-speed movement during said  
4 second interval, said second speed being at least equal  
5 to said first speed.

1           5. The method of claim 4, wherein said movement  
2 imparting step includes accelerating the rolling  
3 movement to said second speed in a plurality of suc-  
4 cessive stages.

1           6. The method of claim 5, wherein said successive  
2 stages include a first stage beginning at least  
3 substantially simultaneously with a start of said  
4 rolling movement and a second stage beginning at least  
5 substantially with a start of said permeability changing  
6 step.

1           7. The method of claim 4, wherein said second  
2 speed is at least close to twice said first speed.

1           8. The method of claim 1, wherein said rolling  
2 movement includes a first-speed movement during said  
3 first interval and a second-speed movement during said second  
4 interval, and further comprising the step of reducing,  
5 upon completion of said permeability changing step, the  
6 speed of rolling movement from said second speed to zero  
7 speed in a plurality of successive stages.

1           9. The method of claim 1, wherein said per-  
2 meability changing step includes perforating at least  
3 one of the tubular wrapper and the strip.

1           10. The method of claim 1, wherein said movement  
2     imparting step includes moving the tubular wrapper side-  
3     ways along an at least substantially straight path bet-  
4     ween a plurality of surfaces at least one of which moves  
5     relative to another thereof.

1           11. The method of claim 1, wherein said movement  
2     imparting step includes moving the tubular wrapper side-  
3     ways along an at least partially arcuate path between  
4     a plurality of surfaces at least one of which moves re-  
5     lative to another thereof.

1           12. Apparatus for treating smokers' products of  
2 the type wherein a rod-shaped component is surrounded  
3 by a tubular wrapper carrying a deformable strip, com-  
4 prising:

5           a rolling unit having surfaces defining a channel  
6 and including first and second surfaces at least one  
7 of which moves relative to the other thereof, said  
8 channel having an inlet and an outlet;

9           means for feeding into said inlet successive pro-  
10 ducts of a series of products having tubular wrappers  
11 each of which is contacted by the respective strip  
12 whereby the wrappers are caused to roll due to contact  
13 with said surfaces and to thus convolute the strips  
14 thereabout in a first portion of the channel at said  
15 inlet; and

16           means for changing the permeability of the  
17 wrappers during rolling at least in a second portion  
18 of the channel between said first portion and said  
19 outlet.

1 13. The apparatus of claim 12, wherein said means  
2 for changing the permeability of the wrappers comprises  
3 means for perforating at least one of the wrapper and  
4 the strip of each of said series of products in said  
5 second portion of said channel.

1 14. The apparatus of claim 12, wherein said  
2 second portion of said channel is immediately adjacent  
3 said first portion as seen in a direction from said  
4 inlet toward said outlet.

1 15. The apparatus of claim 12, wherein said  
2 second portion of said channel partially overlaps said  
3 first portion.

1 16. The apparatus of claim 12, wherein said  
2 rolling unit includes a rotary drum-shaped conveyor  
3 having a peripheral surface constituting said at least  
4 one surface and a stationary rolling member having a  
5 concave surface constituting said other surface.

1           17. The apparatus of claim 16, wherein said  
2 rolling member has a window communicating with said  
3 second portion of said channel and said means for  
4 changing the permeability of the wrappers includes means  
5 for perforating at least one of the wrapper and the  
6 strip of each of said series of products by way of said  
7 window.

1           18. The apparatus of claim 12, wherein said  
2 rolling unit includes a first endless band having an  
3 external surface constituting said at least one surface,  
4 a second endless band having an external surface consti-  
5 tuting said other surface, and means for driving at  
6 least one of said endless bands.

1           19. The apparatus of claim 18, wherein said  
2 external surfaces define at least said first portion  
3 of said channel.

1           20. The apparatus of claim 12, wherein said  
2 rolling unit includes an endless band having an external  
3 surface constituting a portion at least of said at least  
4 one surface, and a stationary rolling member having a  
5 surface constituting said other surface, said second  
6 portion of said channel being defined by said endless  
7 band and said rolling member.

1           21. The apparatus of claim 20, wherein said  
2 rolling member has a window communicating with said  
3 second portion of said channel, said means for changing  
4 the permeability of the wrappers including means for  
5 perforating the wrappers by way of said window.

1           22. The apparatus of claim 20, wherein said band  
2 includes two spaced apart endless sections and said  
3 means for changing the permeability of the wrappers  
4 includes means for perforating the wrappers by radiation  
5 being propagated along a path extending between said  
6 spaced apart sections of said band.

1           23. The apparatus of claim 20, wherein said  
2 endless band comprises three endless sections, one of  
3 said sections being flanked by the other two of said  
4 sections and said other sections cooperating with said  
5 stationary rolling member to define said second portion  
6 of said channel, said three sections cooperating with  
7 a further band to define said first portion of said  
8 channel and said rolling unit further comprising means  
9 for deflecting said one section from said channel  
10 between said first and second portions of said channel.

1           24. The apparatus of claim 12, wherein said  
2 rolling unit includes a first endless band flanking said  
3 first portion of said channel and two additional endless  
4 bands spaced apart from each other and flanking said  
5 second portion of said channel, said means for changing  
6 the permeability of the wrappers including a perforating  
7 unit arranged to perforate the wrappers of successive  
8 products in said second portion of said channel by way  
9 of a clearance between said additional bands.

1           25. The apparatus of claim 24, wherein said means  
2           for changing the permeability of the wrappers includes  
3           means for simultaneously perforating the wrappers of  
4           several successive products in said second portion of  
5           said channel.

1           26. The apparatus of claim 25, wherein said  
2           perforating means includes a source of at least two  
3           laser beams making an angle arranged to ensure the  
4           impingement of laser beams upon pairs of successive  
5           products in said second portion of said channel.

1           27. The apparatus of claim 12, wherein said  
2 rolling unit includes a rotary conveyor having a pe-  
3 ripheral surface forming part of said at least one  
4 surface and said means for feeding comprises product-  
5 receiving flutes provided in said peripheral surface  
6 and arranged to deliver successive products to said  
7 inlet, and further comprising means for expelling  
8 products from said flutes and for filling said flutes  
9 in said first and second portions of said rolling  
10 channel.

1           28. The apparatus of claim 27, wherein said  
2 expelling means comprises pushers movable in and at  
3 least substantially radially of said conveyor between  
4 retracted positions in which the respective flutes are  
5 free to receive portions of products and extended posi-  
6 tions in which the pushers prevent entry of products  
7 into the respective flutes.